<u>In the Claims</u>

Claims 1-35 (Canceled)

36. (Currently Amended) A method of correcting gradient non-linearities in image data comprising:

acquiring image data of a subject in motion in a presence of gradient non-linearities; and

correcting for warping in the acquired image data resulting from the gradient non-linearities present ~~for the motion induced~~ during data acquisition.

37. (Previously Presented) The method of claim 36 wherein the image data is MR data and further comprising the step of transforming the MR data acquired into an image domain and wherein transforming the MR data includes transforming one portion of the MR data at a time into the image domain, applying a warping correction to that portion of the MR data, correcting that portion of the MR data for motion, and accumulating the motion corrected MR data in a final image.

38. (Previously Presented) The method of claim 36 wherein the step of acquiring image data includes acquiring MR data affected by a variation of the gradient non-linearities.

39. (Previously Presented) The method of claim 36 wherein the step of acquiring image data of a subject in motion includes at least one of a scanning object moving with respect to a magnet, an object moving with respect to a gradient coil, a magnet moving with respect to an object, a gradient coil moving with respect to an object, a gradient coil and magnet moving with respect to an object, a gradient coil and object moving with respect to a magnet, a magnet and object moving with respect to a gradient coil, and a moving magnet, gradient coil, and object.

40. (Previously Presented) The method of claim 37 wherein the step of transforming MR data includes Fourier transforming each data point, point by point.

41. (Previously Presented) The method of claim 37 wherein the step of transforming MR data includes Fourier transforming each k-space line of data to the image domain.

42. (Previously Presented) The method of claim 37 wherein the step of correcting motion includes shifting the MR data by a pixel offset and the step of accumulating includes adding the MR data to any previous MR data corrected to form an image with corrected gradient non-linearity.

43. (Previously Presented) The method of claim 36 wherein the motion is induced by a moving table with respect to a bore of a magnet.

44. (Previously Presented) The method of claim 43 wherein the step of acquiring image data includes acquiring MR data that is frequency encoded in a direction of motion and further comprising the step of transforming MR data to include applying a 1-D FFT and placing the 1-D FFT transformed data into an otherwise empty 2D/3D matrix and then applying further Fourier transform along any other directions.

45. (Previously Presented) The method of claim 36 wherein the warping correction is a pre-calculated gradient error calculation.

46. (Previously Presented) The method of claim 44 wherein the gradient error is calculated according to:

$$\hat{s}_{GW}(\vec{r}') = \sum_n f_{GW}\left(s\left(\vec{k}(t_n)\right)e^{j\vec{k}\cdot\vec{r}}\right)e^{-j\vec{k}\cdot\vec{p}(t_n)}$$

where $\sum_n s\left(\vec{k}(t_n)\right)e^{j\vec{k}\cdot r}$ is a reconstruction summation over each k-space point, f_{GW} is a warp correction function, and $\bar{p}(t)$ is a position of a movable table as a function of time.

47. (Previously Presented) A method of correcting gradient non-linearities in moving table MR imaging comprising the steps of:

translating a patient on a movable table within a magnet;

acquiring MR data in a presence of gradient non-linearity; and

correcting distortion in the MR data that is acquired in the presence of gradient non-linearity.

48. (Previously Presented) The method of claim 47 further comprising reconstructing a portion of the MR data into an image, shifting the MR data acquired and reconstructed to compensate for table motion, and determining an amount of MR data to process, wherein the step of shifting the MR data includes shifting the MR data a fixed amount for a given amount of MR data processed.

49. (Previously Presented) The method of claim 48 wherein the step of determining an amount of MR data to process is based on table speed, distance traveled, and an acquisition sequence applied.

50. (Previously Presented) The method of claim 48 further comprising the step of adding the MR data to previously acquired MR data for a given FOV.

51. (Previously Presented) The method of claim 47 wherein the amount of MR data to process at a given time is determined at least partially on table velocity so that the amount of MR data processed can be shifted an equal amount.

52. (Previously Presented) The method of claim 48 wherein a predefined distance is established, based on table velocity and an acquisition sequence applied, for determining the shifting needed to avoid image blurring.

53. (Previously Presented) The method of claim 52 wherein the predefined distance is given by:

$$D = {BW \cdot FOV_{freq} \cdot \tau}\Big/{N_{freq}^2}$$

where BW is receiver bandwidth, FOV_{freq} is a frequency-encoding field-of-view, N_{freq} is a number of frequency encoding points, and τ is a time of travel calculated from the table velocity.

54. (Previously Presented) The method of claim 48 wherein the step of reconstructing includes first Fourier transforming in a direction of table motion, then applying a 2D/3D Fourier transform.

55. (Previously Presented) The method of claim 54 further comprising placing the first Fourier transformed MR data in an otherwise empty matrix to then apply the 2D/3D Fourier transform thereto.

56. (Previously Presented) The method of claim 47 wherein the step of correcting distortion is only performed on MR data that is acquired in the presence of gradient non-linearity.

57. (Previously Presented) The method of claim 47 wherein the step of correcting distortion is performed with a GradWarp function to correct a warping distortion.

58. (Previously Presented) The method of claim 47 wherein the step of correcting distortion is performed with a pre-existing gradient error map.

59. (Previously Presented) The method of claim 47 further comprising the step of monitoring table motion while acquiring MR data.

60. (Previously Presented) The method of claim 47 wherein the MR data is processed by one of line-by-line and point-by-point.

61. (Previously Presented) An MR apparatus having gradient non-linearity compensation for moving objects comprising:

a magnetic resonance imaging system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF

transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images;

a movable table to translate an imaging object about the magnet; and

a computer programmed to:

translate the moving table through the bore of the magnet;

acquire MR data of an imaging object positioned on the moving table as the movable table is translated through the bore of the magnet; and

correct gradient field distortion in the MR data acquired.

62. (Previously Presented) The apparatus of claim 61 wherein the computer is further programmed to correct for motion after application of a GradWarp function.

63. (Previously Presented) The apparatus of claim 62 wherein the GradWarp function uses a predetermined error map of gradient non-linearities.

64. (Previously Presented) The apparatus of claim 61 wherein the gradient field distortion is corrected by the computer being further programmed to:

process the MR data acquired by one of point-by-point and line-by-line;

perform a 1-D FT on the MR data in a direction of table motion;

perform at least one additional FT on the MR data;

apply a GradWarp function on the MR data; and

fill an image space with the MR data.

65. (Previously Presented) The apparatus of claim 64 wherein the image is filled by adding the MR data to build up an image after application of the GradWarp function.

66. (Previously Presented) The apparatus of claim 64 wherein the computer is further programmed to determine an amount of MR data to process and shift the MR data a fixed amount for a given amount of MR data processed.

67. (Previously Presented) A computer program for compensating for gradient non-linearities in moving table MR imaging, the computer program comprising a set of instructions to cause a computer to:

move a patient table with respect to a gradient coil;

acquire MR data; and

correct the MR data for geometric distortion in a resulting image.

68. (Previously Presented) The computer program of claim 67 wherein the MR data acquired is affected by gradient variations.

69. (Previously Presented) The computer program of claim 67 further comprising the instructions of:

place at least one MR data point into a matrix sized based on a desired image dimension sought wherein a remainder of the matrix has zeros therein;

perform an FFT, a type of which is based on the desired image dimension sought, to each MR data point;

apply a GradWarp function to the MR data points;

correct each MR data point for patient table motion; and

add each MR data point to build up an image.

70. (Previously Presented) The computer program of claim 69 wherein the step of correcting for patient table motion includes finding a pixel offset based on motion velocity and shifting the MR data point by the pixel offset.

71. (Previously Presented) The computer program of claim 69 wherein the GradWarp function uses a predetermined error map of gradient non-linearity coefficients.

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